Inside the Earth

Grades	K-6
Duration	40min
Setting	Classroom

TEKS

Science – Ch112

K.4 K.5 K.6 K.7 K.10 1.4 1.5 1.6 1.7 1.10 2.4 2.5 2.6 2.7 2.10
3.5 3.6 3.7 3.11 4.4 4.5 4.6 4.7 4.11 5.4 5.5 5.6 5.7 5.12

Focus Introduce the Earth's interior as a system of 4 layers.

➲ *Read side 2 for* Background.

Objective Construct a playdoh sphere replicating the Earth's layers.

Procedure

1. Invite students to speculate on the contents of the ground beneath us:
   - *How deep is it?*
   - *How much space is there?*
   - *Is there light or is it dark?*
2. Display or circulate images of the Earth's layers. Begin drawing these on the board and invite more questions from the students.
3. When the class is ready, explain that Earth's proposed layers and the science that researchers use to support the idea.
4. Splitting the class into groups of four, distribute the colored playdoh. *First the inner core.* Explain that each person in the group will be responsible for building one layer onto our Earth replica.
5. Have the groups form their core. Then distribute the outer core's playdoh. Remind the students not to deform the first layer. *Be sure the groups are sharing the responsibility of construction as you explain the outer core's activity deep within the Earth.*
6. Repeat Steps #4 & 5 until you've reached the crust.
7. Ask the students to speculate about the crust's thickness. *Do they understand that we are standing on the crust, which includes mountains?*
8. Explain that although the crust is about 20miles down at its deepest, and its rock contents are over three billion years old, its proportion to our billiard sized model is only the thickness of a postage stamp.
9. With the fish wire, the last partner can slice the model into 4 equal parts; students can then paint on the crust.

Materials

Per Group
playdoh
- red = inner core
- orange = outer core
- yellow = mantle

9" length of fishwire
paint brushes
tempra paint

Did You Know?

At the foot of the world's deepest mineshaft, in South Africa, temperatures can reach 122°F (50°C). The temperature at the center of the Earth is probably about 5400°F (3000°C).

➲ *Read side 2 for* Background.

Inside the Earth

Background

As your read this sentence, Africa is being torn apart from Asia, a new mountain range is being shoved up in the Mediterranean, the Red Sea is well on its way to becoming an ocean, and the Pacific Ocean is shrinking. But don't worry. All these events are happening so slowly that during our lifetime we won't even notice the changes.

A hundred years ago many geologists would have scoffed at the idea of moving continents and shrinking oceans. But today most accept the theory that continents, as well as the entire crust of the Earth, are "on the move." Geologists today believe that the Earth has a very specific structure, and that this structure is directly related to the forces inside the Earth, which help to power the changes we see on its surface.

The Earth Inside and Out

Since the early 1900s, geologists have known that the Earth is divided into three main layers: a thin outer **crust**, a thicker **mantle**, and a **core**. But exactly how these layers interact and what they are made of is still open to debate.

The crust is the only layer that geologists can really study first-hand. So geologists have had to study other data, such as the path earthquake shock waves take as they travel through the Earth, to find out more about the mantle and core.

A Thin Skin: The outermost layer of the Earth—the layer we walk on –is a thin, rocky skin that covers the planet. In relation to the Earth, this crust is about as thin as a postage stamp stuck on a billiard ball. At its thickest, which is under mountain ranges, the crust is only about 22 miles (35km) thick—about 1/200th of the Earth's diameter.

By comparing rock samples dredged from the ocean floor with those on the continents, scientists found there were two distinct types of crust: **continental crust** and **oceanic crust**. Continental crust makes up the continents and contains light-colored rocks (such as granite) composed mainly of the elements aluminum, silicon, and oxygen. This layer of the crust is much thicker than the oceanic crust, which forms the ocean floor. Although the oceanic crust is thinner, it is made of denser rocks (such as basalt) containing the elements iron, magnesium, silicon and oxygen. Because of the difference in densities, the lighter continental crust "floats" higher on the underlying mantle than does the oceanic crust.

The Movin' Mantle: Underneath the crust is the much denser mantle. Although no one has ever drilled into the mantle, geologists think it is made up of many of the same elements that form the crust. (The mantle is hotter and denser then the crust because the temperature and pressure inside the Earth increases as the depth increases.)

Although most of the mantle is made up of solid rock, geologists think it is composed of several zones. The uppermost zone, the area lying directly underneath the crust, is cooler and thus more rigid than the lower parts of the mantel. This thin uppermost layer of the mantle, combined with the thin, rocky crust, forms a rigid layer of rock called the **lithosphere**.

Fifty-miles beneath the crust and extending to 100 miles beneath the crust is a zone of molten rock. This zone is the deepest part of the mantle, called the **asthenosphere**. Geologists think that it is a hot, weak zone that is also solid, but can "flow" at a very, very slow rate. Geologists believe that the lithosphere "floats" on this more mobile zone in the mantle, and slides around on it very slowly. The lithosphere is constantly moving, floating on of the more liquid asthenosphere. The lithosphere rises and falls slowly as the weight of the crust above it changes at different points on the Earth's the surface.

Many geologists are convinced that strong **convection** currents exist within the mantle. (Convection is the process by which hot material rises to the surface, spreads and cools, and then sinks again, like soup being heated in a sauce pan.) These convection currents, which geologists think are fueled by heat given off by the core and some radioactive decay in the mantle, constantly transfer heat from the deep mantle to the crust at a very slow rate.

Heavy Metal: Deep within the Earth is the core—a mass of hot, heavy metals (mostly iron and nickel) that sank, due to gravity, after the Earth was formed. The core is almost twice as dense as the mantle and appears to be the main source of heat that triggers the convection currents in the mantle. Geologists know that the core is made up of two very different layers. The **outer core** is molten and is responsible for the Earth's magnetic field. And the **inner core** is solid.

Did You Know?

Over 800,000 earthquakes happen around the world each year. Only 20 or 30 are large enough to be destructive enough to hurt people and damage buildings. Most quakes aren't felt at all.

Bibliography & Sources

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